TECHNICAL REVIEW DOCUMENT OPERATING PERMIT 950PWE096

to be issued to:

Thermo Cogeneration Partnership, L.P.
Weld County
Source ID 1230250

Prepared by Ashley L. Kendall April 3, 1998 Revised by Ashley L. Kendall June 1, 1998

I. Purpose:

This document establishes the basis for decisions made regarding the Applicable Requirements, Emission Factors, Monitoring Plan and Compliance Status of Emission Units covered within the Operating Permit proposed for this site. It is designed for reference during review of the proposed permit by the EPA, the Public and other interested parties. Conclusions made in this report are based on information provided by the applicant in the Title V application submitted December 8, 1995, additional technical submittal of December 16, 1996, a site visit, and review of Division files. This narrative is intended only as an adjunct for the reviewer and has no legal standing.

On April 16, 1998 the Colorado Air Quality Control Commission directed the Division to implement new procedures regarding the use of short term emission and production/throughput limits on Construction permits. These procedures are being directly implemented in all operating permits that had not started their Public Comment period as of April 16, 1998. All short term emission and production/throughput limits that appeared in the construction permits associated with this facility that are not required by a specific State or Federal standard or by the above referenced Division procedures have been deleted and all annual emission and production/throughput limits converted to a rolling 12 month total. Note that, If applicable, appropriate modeling to demonstrate compliance with the National Ambient Air Quality Standards was conducted as part of the Construction Permit processing procedures. If required by this permit, portable monitoring results and/or EPA reference test method results will be multiplied by 8760 hours for comparison to annual emission limits unless there is a specific condition in the permit restricting hours of operation.

Any revisions made to the underlying construction permits associated with this facility made in conjunction with the processing of this operating permit application have been reviewed in accordance with the requirements of Regulation No. 3, Part B, Construction Permits, and have been found to meet all applicable substantive and procedural requirements. This operating permit incorporates and shall be considered to be a combined construction/operating permit for any such revision, and the permittee shall be allowed to operate under the revised conditions upon issuance of this permit without applying for a revision to this permit or for an

additional or revised Construction Permit.

II. Source Description:

This source is primarily classified as a cogeneration facility defined under Standard Industrial Classification 4911. Electricity for sale is produced by five (5) combustion turbines equipped with duct burners. The waste heat from the turbines then heats a nearby tomato greenhouse. There is also a cooling tower, emergency back-up generator, fire pump and two (2) gas powered chillers located at the facility.

The facility is located in Ft. Lupton in an area designated as attainment for all criteria pollutants. This source is considered to be a major source in an attainment area (Potential to Emit > 100 tons/year) and is considered major for purposes of Prevention of Significant Deterioration (PSD) regulations. Future modifications to this facility which are in excess of significance levels as defined in Colorado Regulation No. 3, Part A, Section I.B.58, would result in the application of PSD regulations. Facility wide emissions are as follows:

<u>Pollutant</u>	Potential to Emit (tpy)	Actuals (tpy)
PM	94.04	94.04
PM10	94.03	94.03
SO2	10.76	10.76
NOx	601.51	601.51
VOC	48.67	48.67
CO	456.09	456.09

Potential to Emit is based on permitted limits. Actual emissions were not provided therefore they were assumed to be at potential.

The plant is within 100 kilometers of Rocky Mountain National Park, a Federal Class I designated area. There are no affected states (within a 50 mile radius) associated with this facility.

This facility certified within the Title V application they are not subject to 112(r), the Accidental Release Requirements.

III. Emission Sources:

The following sources are specifically regulated under terms and conditions of the Operating Permit for this Site:

<u>Units S001- S005</u> - Five (5) General Electric LM6000 Natural Gas Combustion Turbines, Rated at 296 MMBtu/hr Each, SN's: 185-130, 185-126, 185-135, 185-136 and 185-137, Equipped with Five (5) Coen 12408-1 Duct Burners, Two (2) Rated at 240 MMBtu/hr and Three (3) Rated at 180 MMBtu/hr.

Discussion:

- 1. Applicable Requirements- These turbines were installed and began operation in May 1994. Initial approval permits for these units were issued on February 19, 1992. In 1996 all five permits for all five turbines were consolidated into one permit, reconsideration of the Best Achievable Control Technology (BACT) was done, and the incorporation of enhanced steam injection for control of NOx rather than dry low NOx combustion technology was made. Initial Approval 91WE667 was issued July 26, 1996 with the following applicable requirements:
- A. These turbines and duct burners are subject to the Prevention of Significant Deterioration (PSD) provisions. Requirement of BACT is applicable for control of Oxides of Nitrogen, Carbon Monoxide, and Particulate Matter. The following is determined as BACT:

Oxides of Nitrogen (NOx) - Enhanced steam injection shall be used to control NOx. NOx shall not exceed 25 ppmvd, averaged on a daily basis at 15% oxygen.

<u>Carbon Monoxide (CO)</u> - Good combustion control and sustained operation at consistently high load levels shall be practiced to minimize emissions of CO. CO shall not exceed 25 ppmvd, averaged on a daily basis at 15% oxygen.

<u>Particulate Matter (PM)</u> - Only natural gas shall be used to minimize the emissions of particulate matter.

- B. The gas turbines are subject to Regulation No. 6 Standards of Performance for New Stationary Sources, Part A Federal Register Regulations Adopted by Reference, Subpart GG Standards of Performance for Stationary Gas Turbines, as follows:
 - Concentration of NOx shall not exceed 126.9 ppmvd at 15% oxygen. This is superseded as the BACT requirement is more stringent.

NSPS GG requires that the fuel be analyzed for sulfur content and that the sulfur dioxide emissions cannot exceed 0.015% by volume @ 15% oxygen on a dry basis and that the sulfur content of fuel cannot exceed 0.8 % by weight. Based on engineering judgement, the Division has determined that the exclusive use of natural gas as a fuel will be sufficient to ensure compliance with these standards.

The duct burners are subject to Regulation No. 6 - Standards of Performance for New Stationary Sources, Part A - Federal Register Regulations Adopted by Reference, Subpart Db - Standards of

Performance for Industrial-Commercial-Institutional Steam Generating Units, as follows:

- b. Emission of NOx shall not exceed:
 - (I) 0.10 lb/MMBtu at low heat release rate (heat release rate of less than 70,000 Btu per second per cubic foot.
 - (ii) 0.20 lb/MMBtu at high heat release rate (heat release rate of greater than 70,000 Btu per second per cubic foot.

This section from construction permit 91WE667 is referencing the wrong subsection of Db. The turbine and duct burner are used in a combined cycle system and therefore are limited to 0.2 lb/MMBtu at all heat release rates.

The emission limits mentioned in Part F of this section are based on an emission factor for the duct burners of 0.09 lb/MMBtu for NOx. For streamlining purposes only the more stringent emission limitations from Part F shall be included in the operating permit.

In addition, the requirements of Regulation No. 6, Part A, Subpart A, General Provisions, apply.

- C. Visible emissions shall not exceed twenty percent (20%) opacity.
- D. The exhaust stacks of the turbine shall be equipped with a continuous emission monitoring (CEM) system to measure and record the following:
 - -Concentration of Oxides of Nitrogen, Carbon Monoxide and oxygen.
 - -The system shall calculate and record concentrations of Oxides of Nitrogen and Carbon Monoxide in terms of ppmvd, corrected to 15% oxygen, and averaged over a 24 hour period (mid-night to mid-night).

Quality assured CEM data shall be available for a minimum of 90% of the duration of the operation. For the periods, when such data is not available, the highest reading recorded during the previous 30-day period shall be substituted for the missing data.

The Division may take direct enforcement action based solely on CEM data if the data shows any excursions above the NOx limitations established in Condition A.

CEMs shall be inspected, maintained, calibrated, and certified as per the Division's procedures.

In addition, fuel gas flow meters/recorders shall be installed to measure and record flowrates (scf/yr) to each of the turbines and duct burners. Steam flow meters/recorders shall be installed to measure and record the steam flowrates (tons/yr) used for enhanced steam injection in the turbines for control of NOx.

E. Total consumption of Natural Gas by the five gas turbines shall not exceed 10,375 MMscf/yr.

Total consumption of Natural Gas by the five duct burners shall not exceed 4,575 MMscf/yr.

F. Emissions of air pollutants from each gas turbine/duct burner combination shall not exceed the following limitations:

Particulate Matter 16.81 tons/yr Particulate Matter $< 10\mu m$ 16.81 tons/yr Sulfur Dioxide 2.00 tons/yr Nitrogen Oxides 146.50 tons/yr

Volatile Organic Compounds 9.46 tons/yr and 3.63 lbs/hr

Carbon Monoxide 90.51 tons/yr

The short term limit has been removed per the policy change stated above.

Total emissions of air pollutants from all five gas turbines/duct burners shall not exceed the following:

 $\begin{array}{lll} \mbox{Particulate Matter} & 84.05 \ tons/yr \\ \mbox{Particulate Matter} < 10 \mu m & 84.05 \ tons/yr \\ \mbox{Sulfur Dioxide} & 10.00 \ tons/yr \\ \mbox{Nitrogen Oxides} & 589.00 \ tons/yr \\ \mbox{Volatile Organic Compounds} & 48.20 \ tons/yr \\ \mbox{Carbon Monoxide} & 452.55 \ tons/yr \\ \end{array}$

G. Revised APEN reporting in accordance with Regulation No.3, Part A.II.

The due date of the first semi-annual monitoring report required by this operating permit will be more than 180 days after the initial approval construction permit was issued and/or the equipment commenced operation. Therefore, the Division considers that the Responsible Official certification submitted with that report will serve as the self-certification for construction permit 91WE667 and the appropriate provisions of the construction permit have been directly incorporated into this operating permit.

2. Emission Factors- Emissions from these turbines are produced during the combustion process, and are dependent upon operating conditions and specific properties of the natural gas being burned. The pollutants of concern are Nitrogen Oxides (NO_X), Carbon Monoxide (CO), Volatile Organic Compounds (VOC), Sulfur Oxides (SO_X), Particulate Matter (PM and PM_{10}) and Lead. Small quantities of Hazardous Air Pollutants (PM and PM_{10}) are also emitted dependent upon the makeup of the fuel and combustion efficiency. The Compliance Emission Factors used to determine compliance with emission limits in the Permit for the turbines and duct burners are from manufacturer's data and are compared to PM0. Section 3.1, Table 3.1-1 for Stationary Gas Turbines for Electric Generation and Table 1.4-1 for Large Boilers for the duct burners. CEMs will be required to determine the

emissions of NOx and CO from the turbines.

Turbines:

<u>Pollutant</u>	Emission Factor (lb/MMBtu)	AP-42 (lb/MMBtu)
PM	0.014	0.042
SO2	0.00134	0.94(S)*
VOC	0.00564	0.024

^{*} where 'S' is the sulfur content of the fuel.

The source requested the use of lb/MMscf based emission factors for calculation of turbine emissions. It is Division policy to use lb/MMBtu based emission factors for natural gas due to the varying Btu content. This insures Btu dependent calculations for emissions. Therefore, the emission factors shall be expressed as lb/MMBtu.

Duct Burners:

Pollutant Pollutant	Emission Factor (lb/MMscf)	AP-42 (lb/MMscf)
PM	5.0	5.0
SO2	1.34	0.6
VOC	8.0	1.41

- **3. Monitoring Plan-** The source indicated they would demonstrate compliance with the limits by computing monthly fuel consumption and performing monthly emission calculations. NOx and CO emissions shall be determined from the CEMs data. The Btu content of the gas shall be determined semi-annually. The use of natural gas shall demonstrate compliance with the 20% opacity standard.
- **4. Compliance Status-** Current APENs reporting criteria and HAP emissions are on file with the Division. Due to modification of the permit and review of the sources files these turbines are currently considered to be in compliance with all applicable requirements.

<u>Unit S006</u> - One Detroit Diesel 8163-7416 Emergency Back-up Engine, Rated at 8.57 MMBtu/hr, SN: Unknown.

Discussion:

- 1. Applicable Requirements-This unit was installed and began operation in May of 1994. The unit was originally permitted on March 3, 1993 with a transfer of ownership issued on September 3, 1994 (92WE1488-1) with the following applicable requirements:
- A. Visible emissions shall not exceed twenty percent (20%) opacity.
 - If startup lasts less than 6 minutes, the Method 9 reading required for startup in the permit cannot be done.
- B. Emissions of air pollutants shall not exceed the following limitations:

Particulate Matter	0.27 tons/yr	2.18 lbs/hr
PM10	0.26 tons/yr	2.08 lbs/hr
Sulfur Dioxide	0.59 tons/yr	4.67 lbs/hr
Nitrogen Oxides	3.81 tons/yr	30.47 lbs/hr
Volatile Organic Compounds	0.26 tons/yr	2.08 lbs/hr
Carbon Monoxide	1.49 tons/yr	11.91 lbs/hr

Only the emission limit for NOx will be included in the operating permit. The other emission limits are all below deminimis and have a corresponding throughput limit to demonstrate compliance.

The short term limits have been removed per the policy change stated above.

- C. Consumption of number 2 diesel fuel shall not exceed 16,250 gallons per year.
- D. Revised APEN reporting in accordance with Regulation No. 3, Part A.II.C.

The due date of the first semi-annual monitoring report required by this operating permit will be more than 180 days after the initial approval construction permit was issued and/or the equipment commenced operation. Therefore, the Division considers that the Responsible Official certification submitted with that report will serve as the self-certification for construction permit 92WE1488-1 and the appropriate provisions of the construction permit have been directly incorporated into this operating permit.

- **2. Emission Factors-** Emissions from this engine are produced during the combustion process, and are dependent upon operating conditions and specific properties of the fuel being burned. The pollutants of concern are Nitrogen Oxides (NO_x), Carbon Monoxide (CO), Volatile Organic Compounds (VOC), Sulfur Oxides (SO_x), Particulate Matter (PM and PM $_{10}$) and Lead. Small quantities of Hazardous Air Pollutants (HAPs) are also emitted dependent upon the makeup of the fuel and combustion efficiency. The Compliance Emission Factors used to determine emission limits in the Permit for the engine are from the EPA Compilation of Air Pollution Emission Factors (AP-42) Section 3.4, Tables 3.4-(1-2), Emission Factors for Large Stationary Diesel Engines.
- **3. Monitoring Plan-** The source indicated they would demonstrate compliance by recording fuel use each time fuel is added to the generator service tank. The source will be required to calculate emissions monthly. The Btu content of Number 2 Diesel does not vary enough to require Btu analysis. Therefore, a value of 131,890 Btu/gallon (from application) has been used to convert the emission factors above to lb/gallon. Compliance with the opacity standard shall be demonstrated using Method 9 observations.
- **4. Compliance Status-** Current APENs reporting criteria and HAP emissions are on file with the Division. This engine is currently considered to be in

<u>Unit S007</u> - One Clark DDFP-T6AT Emergency Diesel Fired Fire Pump, Rated at 2.28 MMBtu/hr

Discussion:

- **1. Applicable Requirements-** This unit was installed and began operation in May of 1994. The unit was originally permitted on March 3, 1993 with a transfer of ownership issued on September 3, 1994 (92WE1488-2) with the following applicable requirements:
- A. Visible emissions shall not exceed twenty percent (20%) opacity.

If startup lasts less than 6 minutes, the Method 9 reading required in the permit cannot be done.

B. Emissions of air pollutants shall not exceed the following limitations:

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Particulate Matter	0.07 tons/yr	0.58 lbs/hr
PM10	0.07 tons/yr	0.55 lbs/hr
Sulfur Dioxide	0.14 tons/yr	1.13 lbs/hr
Nitrogen Oxides	1.52 tons/yr	12.15 lbs/hr
Volatile Organic Compounds	0.07 tons/yr	0.56 lbs/hr
Carbon Monoxide	0.25 tons/yr	1.99 lbs/hr

No emission limits will be included in the operating permit. The emission limits are all below deminimis and have a corresponding throughput limit to demonstrate compliance.

- C. Consumption of number 2 diesel fuel shall not exceed 4,325 gallons per year.
- D. Revised APEN reporting in accordance with Regulation No. 3, Part A.II.C.

The due date of the first semi-annual monitoring report required by this operating permit will be more than 180 days after the initial approval construction permit was issued and/or the equipment commenced operation. Therefore, the Division considers that the Responsible Official certification submitted with that report will serve as the self-certification for construction permit 92WE1488-2 and the appropriate provisions of the construction permit have been directly incorporated into this operating permit.

2. Emission Factors- Emissions from this engine are produced during the combustion process, and are dependent upon operating conditions and specific properties of the fuel oil being burned. The pollutants of concern are Nitrogen Oxides (NO_x), Carbon Monoxide (CO), Volatile Organic Compounds (VOC), Sulfur Oxides (SO $_x$), Particulate Matter (PM and PM $_{10}$) and Lead. Small quantities of Hazardous Air Pollutants (HAPs) are also emitted dependent upon the makeup of the fuel and combustion efficiency. The Compliance Emission Factors used to determine emission limits in the

Permit for the engine are from the EPA Compilation of Air Pollution Emission Factors (AP-42) Section 3.3, Tables 3.3-1, Emission Factors for Diesel Industrial Engines.

- **3. Monitoring Plan-** The source indicated they would demonstrate compliance by recording fuel use each time fuel is added to the fire pump service tank. Compliance with the opacity standard shall be demonstrated using Method 9 observations.
- **4. Compliance Status-** Current APENs reporting criteria and HAP emissions are on file with the Division. This engine is currently considered to be in compliance with all applicable requirements.

<u>Unit S008 - S009</u> - Two (2) Trane ABDL 110 Natural Gas Fired Water Chillers, Rated at 13.674 MMBtu/hr Each, SN: Unknown.

Discussion:

- 1. Applicable Requirements- These units were installed and began operation in May of 1994. The units were permitted (for three chillers) on March 3, 1993 with a transfer of ownership issued September 1993 (92WE1488-3) with the following applicable requirements:
- A. Visible emissions shall not exceed twenty percent (20%) opacity.
- B. Total emissions of air pollutants shall not exceed the following limitations:

Particulate Matter	0.15 tons/yr	0.12 lbs/hr
PM10	0.15 tons/yr	0.12 lbs/hr
Sulfur Dioxide	0.03 tons/yr	0.02 lbs/hr
Nitrogen Oxides	7.18 tons/yr	5.74 lbs/hr
Volatile Organic Compounds	0.14 tons/yr	0.11 lbs/hr
Carbon Monoxide	1.80 tons/yr	1.44 lbs/hr

Only the emission limit for NOx will be included in the operating permit. The other emission limits are all below deminimis and have a corresponding throughput limit to demonstrate compliance.

The short term limits have been removed per the policy change stated above.

- C. Total consumption of natural gas shall not exceed 102,555 MMscf/yr.
- D. Revised APEN reporting in accordance with Regulation No. 3, Part A.II.C.

The due date of the first semi-annual monitoring report required by this operating permit will be more than 180 days after the initial approval construction permit was issued and/or the equipment commenced operation. Therefore, the Division considers that the Responsible Official certification submitted with that report will serve as the self-certification for construction

permit 92WE1488-3 and the appropriate provisions of the construction permit have been directly incorporated into this operating permit.

- **2. Emission Factors-** Emissions from this chiller are produced during the combustion process, and are dependent upon operating conditions and specific properties of the natural gas being burned. The pollutants of concern are Nitrogen Oxides (NO_x), Carbon Monoxide (CO), Volatile Organic Compounds (VOC), Particulate Matter (PM and PM_{10}) and Lead. Small quantities of Hazardous Air Pollutants (PM and PM_{10}) are also emitted dependent upon the makeup of the fuel and combustion efficiency. The Compliance Emission Factors used to determine emission limits in the Permit for the chiller are from the EPA Compilation of Air Pollution Emission Factors (PM AP) Section 1.4, Tables 1.4-(1-3), Emission Factors from Natural Gas Combustion and maximum allowed H2S content of the fuel limited by contract.
- **3. Monitoring Plan-** The source indicated they would demonstrate compliance by monitoring fuel consumption and hours of operation daily and recording in a log book. Fuel consumption and emission calculations shall be done monthly. The use of natural gas shall be used to demonstrate compliance with the 20% opacity standard.
- **4. Compliance Status-** Current APENs reporting criteria and HAP emissions are on file with the Division. This chiller is currently considered to be in compliance with all applicable requirements.

<u>Unit S011</u> - One Custom Forced Draft Industrial Cooling Tower Equipped with Munters D15 Drift Eliminators.

Discussion:

- **1. Applicable Requirements-** This unit was installed and began operation in May of 1994. The unit was not permitted until December 26, 1997 by Colorado Construction Permit 96WE075 with the following applicable requirements:
- A. Process rate, in terms of the circulating water, shall not exceed 5,346,000 gallons per hour, and 46,680,000,000 per year.
 - The short term limits have been removed per the policy change stated above.
- B. Consumption of Sodium Hypochlorite solution (bleach), of commercially available strength for such use, shall not exceed 2,500 gallons per month, and 30,000 gallons per year. (This condition is not included in the operating permit. The bleach consumption limit is designed to limit chloroform production. It has since been determined that the production of cholorform is APEN deminimis and therefore, this condition has been removed).
- C. Representative samples of circulating water shall be analyzed for total

dissolved solids (TDS) at least once in a period of a calendar month.

- D. This source is subject to the odor requirements of Regulation No. 2.
- E. Emissions of air pollutants shall not exceed the following limitations: Particulate Matter 9.5 tons/yr 2.2 lbs/hr Particulate Matter < 10μ m (PM10) 9.5 tons/yr 2.2 lbs/hr

The short term limits have been removed per the policy change stated above.

F. APEN reporting in accordance with Regulation NO. 3, Part A.II.

The due date of the first semi-annual monitoring report required by this operating permit will be more than 180 days after the initial approval construction permit was issued and/or the equipment commenced operation. Therefore, the Division considers that the Responsible Official certification submitted with that report will serve as the self-certification for construction permit 96WE075 and the appropriate provisions of the construction permit have been directly incorporated into this operating permit.

- **2. Emission Factors-** Emissions from cooling towers is produced from the liquid water entrained in the air stream and carried out of the tower as "drift" droplets. The particulate matter contained in the drift droplets is of concern.
- 3. **Monitoring Plan-** The source indicated they would demonstrate compliance by determining bleach usage from purchase orders accompanying each shipment. They also indicated if no design changes are done to the cooling tower it will always be in compliance. However, the source shall be required to monitor circulation rate of the cooling tower and calculate emissions on a monthly basis. As well as, analyze samples of circulating water monthly for total dissolved solids (TDS).
- **4. Compliance Status-** Current APENs reporting criteria and HAP emissions are on file with the Division. This tower is currently considered to be in compliance with all applicable requirements.

IV. Insignificant Activities

Generator lube oil service tanks, < 3,000 gallons
2 diesel fuel oil service tanks, < 500 gallons
Waste oil storage tank, 300 gallons
Temporary waste oil storage drums, 55 gallon
Portable propane heating units, < 1 MMBtu/hr
Sodium hypochlorite storage tank, 2500 gallon
Aqueous sulfuric acid storage tank, 1,500 gallon
Forklift
Gasoline powered pressurized water parts washer, < 5 HP
Natural Gas space heaters, combined total heat < 6 MMBtu/hr

The source requsted the ability to temporarily or permanently replace turbines during times of turbine breakdown or periodic maintenance.

VI. Permit Shield

40 CFR 63, Subpart Q - The cooling tower is not subject to this MACT because it does not operate with chromium-based water treatment chemicals.

40 CFR 60, Subparts K, Ka, Kb (Colorado Reg. 6, Part A, Subpart K, Ka, Kb) - All tanks at the facility are smaller than the threshold limits in these subparts.

40 CFR 72, Federal Acid Rain Permitting Provisions (Colorado Regulation No. 18) - The facility is exempted from the acid rain regulations by 40 CFR 72.6(b)(5). The facility is a qualifying facility that entered into a power purchase agreement for more than 15% of its total capacity prior to November 15, 1990.